AFML-TR-70-229 DCIC REPORT 70-2

OPERATION OF THE DEFENSE CERAMIC INFOMATION CENTER

TECHNICAL REPORT AFML-TR-70-229

OCTOBER 1970

AIR FORCE MATERIALS LABORATORY
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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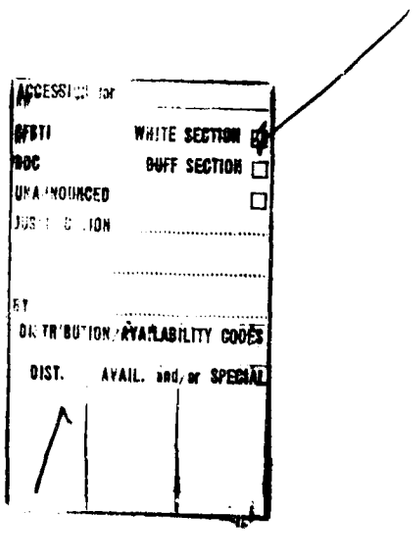

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OPERATION OF THE DEFENSE CERAMIC INFORMATION CENTER

Winston Duckworth
Battelle Memorial Institute

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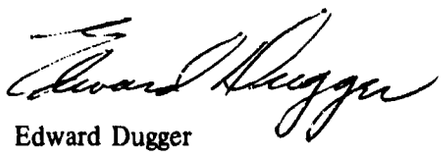
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

FOREWORD

This report was prepared by Battelle Memorial Institute, Columbus (Ohio) Laboratories, for the U.S. Air Force under Contract No. F33615-69-C-1493. The contract was conducted under Project Number 8975, "Materials Information Analysis Centers". The work was administered under the direction of the Air Force Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. Mr. B. R. Emrich, Information Branch (LAM), Materials Support Division, is the AFML Program Manager.

This report constitutes the interim report required by the above contract summarizing activities for the period, May 1, 1969, through April 30, 1970. The report was submitted to AFML for review and prior approval.

This technical report has been reviewed and is approved.



Edward Dugger
Chief, Materials Information Branch
Materials Support Division
Air Force Materials Laboratory

ABSTRACT

This report summarizes activities of the Defense Ceramic Information Center (DCIC) during the third year of its operation at Battelle Memorial Institute's Columbus Laboratories. Information is given on the nature and distribution of the various products and services provided by the Center, and on the Center's funding and costs. A report of DCIC's Advisory Committee is included.

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OPERATION OF THE DEFENSE CERAMIC INFORMATION CENTER

INTRODUCTION

The Defense Ceramic Information Center (DCIC) has been operated continuously since May, 1967, by Battelle Memorial Institute under Contract with the Air Force Materials Laboratory.* DCIC is a Department of Defense information analysis center, as defined in DoD Instruction 5100.45, "Centers for Analysis of Scientific and Technical Information", with responsibility for coverage of ceramic science and technology.

DCIC gathers, treats, and disseminates technical information about ceramic materials in response to needs that arise within the defense community. The operation features use of active research workers in the field, usually ceramists on the Battelle staff, for imparting specialized knowledge and insight to outputs and for guiding the collection of information. At the Center, collected data and information are critically evaluated, sifted, interpreted, compiled, condensed, and otherwise recast to provide succinctly responsive outputs.

DCIC Report 69-6 (AFML-TR-69-210), "Report on Defense Ceramic Information Center", August, 1969, described DCIC in considerable detail and told of accomplishments during the first 2 years of its operation. This report briefly summarizes activities during the third year, which ended May 1, 1970, and constitutes a progress report for that period.

PRODUCTS AND SERVICES

DCIC's routine outputs consist of (1) a periodical, *Ceramic Awareness Bulletin*, (2) descriptive listings of current government ceramic projects, *Ceramic R&D Programs*, (3) a databook, *Engineering Properties of Ceramics*, and (4) responses to inquiries. Also, DCIC makes critical-review and state-of-the-art studies of carefully selected subjects, and issues special topical reports on them.

Table I gives the number of items of each type of output provided by DCIC during the period of this report and indicates the nature of the audience served by each. Indicated user needs, usually in the form of specific requests, constitute the basis for output dissemination.

*AF Contract F33615-67-C-1472 prior to August, 1969; Contract F33615-69-C-1493, thereafter.

TABLE I. DISSEMINATION OF DCIC OUTPUTS

Output	Number Distributed[a]	User, percent		
		Industrial	Government	Academic
Ceramic Awareness Bulletin (six issues)	4678	62	30	8
R&D Program Summaries	360	40	57	3
Special Reports	1330	58	34	8
Inquiry Responses				
Technical	208	65	32	3
Nontechnical	538	—	—	—

(a) Excludes DCIC products distributed by the Defense Documentation Center (DDC) and the Federal Clearinghouse (CFSTI).

Ceramic Awareness Bulletin*

The six issues of *CAB* published between May, 1969, and May, 1970, presented digests of 132 selected technical reports, five special review articles (e.g., technical briefings), and notices of 192 new government ceramic R&D programs.

CAB is currently distributed to an audience of 830. A survey** of the audience conducted just prior to the present reporting period resulted in eliminating about 100 apparently disinterested recipients from the distribution (from 836 to 740). Since then, some 15 requests have been received each month for inclusion on the distribution list, resulting in the present audience of 830.

The survey indicated that *CAB* is basically a sound instrument for information dissemination which serves an important DoD need. Most recipients liked it, used it, and wanted more of the same. In view of this encouraging survey reaction, effort was initiated during the year to insure that *CAB* reaches all who can use it to advantage in defense work. A list of 1200 potential users who do not now receive *CAB* has been developed, and copies of a future issue will be sent to these individuals with an appropriate accompanying letter telling of its availability on request.

It is anticipated that the *CAB* audience will be doubled by this action, and the contribution of DCIC to defense work will be extended significantly as the result.

*Formerly, "Current Awareness Bulletin".

**DCIC Report 69-3, "Value and Prospects of the DCIC *Current Awareness Bulletin*, July, 1969.

Special Reports

Table II gives data on special reports that have been prepared and distributed by DCIC.

Six of these special reports were issued during the past year. Of the six, five were compilations of government ceramic R&D programs, issued to inform managers and workers of the general nature and extent of current government ceramic activity. This DCIC service has been well received in the defense community. The indicated utility of the R&D compilations is believed to make the effort expended in their assembly quite worthwhile. The service has been used, for example, to provide information needed in The Technical Cooperation Program (TTCP).

The only special technical study undertaken at DCIC during the year resulted in the special report, "Hugoniot Properties of Ceramics", a subject of intense defense interest in connection with the development of ceramics for armor. DCIC activity on critical-review and state-of-the-art studies was curtailed as a budgetary measure, primarily to allow increased effort on the databook, *Engineering Properties of Ceramics.*

Inquiries

In this report period, DCIC answered 208 technical and 516 nontechnical phone and letter queries, and received 27 visitors seeking information.

Statistics on the nature and sources of technical inquiries are given in Tables III and IV. The most frequent requests were for ceramic property data, followed by requests for advice on the processing of various ceramic materials, and then by requests for information on some aspect of end uses for ceramic materials. As in the past, over twice as many inquiries were from industry as from government agencies, and relatively few were from academic institutions or other information centers. The technical inquiries from government agencies were distributed as follows:

Agency	Percent
Air Force	69
Army	10
Navy	5
NASA	4
AEC	4
Other	8

The cost of processing technical inquiries at DCIC has decreased from an average of about $115 to $80 per inquiry during the 3 years of operation. This decrease has resulted from less technical staff time being required owing to the availability of more information in DCIC files.

TABLE II. SUMMARY OF DCIC SPECIAL REPORTS

Title	Designation and Date	Number of Pages	Sources of Availability	Number of Copies Distributed by DCIC		
				Initial	Requested	Total
A Review of Glasslike Carbons	DCIC 68-2 April, 1968	44	CFSTI/DDC[a]	324	83	407
The Evaluation and Interpretation of Mechanical Properties of Brittle Materials	DCIC 68-3 April, 1968	191	DCIC only	216	128	344
Carbon Composites for Reentry Vehicles (classified)	DCIC 68-4 June, 1968	46	DCIC only	58	31	89
Ceramic Armor Technology	DCIC 69-1 May, 1969					
Part I, Proceedings of Symposium		124	DCIC only	174	65	239
Part II, Proceedings of Symposium (classified)		56	DDC only	173	—	173
Part III, Bibliography		24	DCIC only	174	65	239
Surface Energy of Ceramics	DCIC 69-2 July, 1969	94	CFSTI/DDC	92	51	143
Soviet Research on Protective Coatings for Graphite	CAB Issue No. 9 April, 1968	9	DCIC/DDC	603	—	603
Carbon/Graphite Fiber	CAB Issue No. 16 May-June, 1969	12	DCIC/DDC	783	20	803
Hugoniot Properties of Ceramics	CAB Issue No. 21 March-April, 1970	5	DCIC/DDC	914	—	914
Ceramic R&D Programs	DCIC 68-5		DCIC/DDC			
Part I, Air Force	July, 1968	70		650	50	700
Part II, Army and Navy	August, 1968	57		670	30	700
Part III, Other Government Agencies	November, 1968	63		700	30	730
Summary of Papers, 9th Carbon Conference	May, 1969	218	American Carbon Committee[b]	~500	~125	~625

TABLE II. SUMMARY OF DCIC SPECIAL REPORTS (Continued)

Title	Designation and Date	Number of Pages	Sources of Availability	Number of Copies Distributed by DCIC		
				Initial	Requested	Total
Bibliography on Ceramic Fibers and Fibrous Composites	DCIC 69-4 August, 1969		CFSTI/DDC			
Part I, Literature		40		—	22	22
Part II, Patents		22		—	22	22
Ceramic R&D Programs	DCIC 69-5		DCIC/DDC			
Part I, Air Force	August, 1969	104		74	47	121
Part I Supplement, Air Force	April, 1970	32		121	—	121
Part II, Army	December, 1969	62		91	30	121
Part III, Navy	December, 1969	50		91	30	121
U.S. Air Force R&D Programs, 1969-1970 for TTCP	March, 1970	136	(c)	45	—	45
Value of the Databook, *Engineering Properties of Ceramics*	DCIC 68-1 January, 1968	19	—	100	6	106
Value and Prospects of the DCIC *Current Awareness Bulletin*	DCIC 69-3 July, 1969	14	—	42	—	42

(a) CFSTI — Clearinghouse for Scientific and Technical Information, Springfield, Virginia 22151.
DDC — Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314.
(b) Distribution made by The American Carbon Committee, The Pennsylvania State University, University Park, Pennsylvania.
(c) Distribution made by DCIC to members of the Technical Cooperation Program (USA, England, Canada, Australia).

In the 3 years of DCIC's operation, the number of nontechnical inquiries has increased each year from 233 to 361 to 516. Most of these inquiries were requests for one of the following:

(1) Information on the nature and availability of DCIC services and products

(2) DCIC publications

(3) Further information about reports or R&D activities announced in the *Ceramic Awareness Bulletin*

(4) Help in locating documents

(5) Information on the source or availability of papers presented at technical meetings.

TABLE III. NATURE OF TECHNICAL INQUIRIES

Subject Area	Number of Technical Inquiries Answered During Program			
	First Year	Second Year	Third Year	Total
Property Data	77	72	74	223
Materials Processing	37	58	43	138
Test Methods	11	8	12	31
Materials Behavior	11	18	14	43
Applications	29	44	33	106
Economic Factors	3	16	5	24
General State of the Art	11	4	8	23
Government R&D Programs	0	16	19	35
Total	179	236	208	623

TABLE IV. SOURCES OF TECHNICAL INQUIRIES

Sector	Number of Technical Inquiries Answered During Program			
	First Year	Second Year	Third Year	Total
Industry	104	159	136	399
Government	56	59	64	179
Information Centers	11	10	2	23
Academic	8	8	6	22
Total	179	236	208	623

Databook

New data have been compiled for updating and upgrading the following sections of DCIC's *Databook:* Borides, Carbides, Intermetallics, Nitrides, Single Oxides, and Mixed Oxides. These data are now being critically reviewed and, when appropriate, incorporated in drafts of revised sections of the book for subsequent issuance.

Also, arrangements were made to have authorities at the National Bureau of Standards critically review sections of the *Databook* dealing with effects of material and testing variables on property values, with a view toward making needed changes and incorporating new knowledge in revised versions of these sections.

Final copy ready for publication should be available from both activities during the next 6 months.

INFORMATION INPUT

DCIC identifies, collects, processes, and catalogs such ceramic technical information as is necessary to mission performance. The information-input operation* features aggressiveness and selectivity in coverage, geared to the generation of output communications that are timely, authoritative, and responsive to audience needs.

Processing steps involved in DCIC's information-input operations are as follows:

Processing Step	Personnel
(1) Collection	Information specialist
(2) Duplication check	Clerical
(3) Technical evaluation (accept-reject)	Technical specialist
(4) Cataloging by bibliographic description	Clerical
(5) Abstracting and technical subject indexing	Information specialist
(6) Preparing abstract cards	Clerical
(7) Filing of abstract cards by subject index	Information specialist
(8) Storing of accessions by identifying numbers	Clerical

*The operation is described in Appendix B of DCIC Report 69-6 (AFML-TR-69-210), "Report on Defense Ceramic Information Center", August, 1969.

Some 6100 documents have been processed into DCIC files either as hard copy or microfilm, as detailed in Table V. Items from open literature and government reports comprise 51 and 37 percent, respectively, of the total accessions. Most of the items from the open literature contain potential data or information for revising the ceramic property *Databook*.

DCIC's mission requires fresh and complete information on government ceramic R&D activities. For this reason, special attention is given in DCIC's information-input operation to identifying and characterizing pertinent government projects and to collecting ceramic technical information from them as it is generated. This activity results in DCIC having a unique information base containing extensive new ceramic science and technology. Much of the information from government projects, even though excludable from controlled distribution, will never reach the open archival literature or will reach it only after long delays. A continuing concern at DCIC has been with developing approaches to transferal of the DCIC-collected information from government projects so that the information becomes widely and permanently available. During the year, a pilot study was designed to examine the feasibility of a joint DCIC-American Ceramic Society publishing endeavor for this purpose.

TABLE V. DCIC ACCESSIONS

Source	Number of Accessions May, 1969, to May, 1970		May, 1967, to May, 1969	Total
Open literature (domestic and foreign journals, books, trade literature, and technical meeting papers)	1175		1975	3150
U.S. R&D project reports	810		1475	2285
Foreign R&D project reports	51		50	101
Inquiry responses and personal communications	211		400	611
	2247	+	3900	6147

MEETINGS AND PUBLICITY

During the year, DCIC representatives attended the 12 meetings listed in Table VI for the dual purposes of publicizing DCIC's services and either collecting new ceramic technical information or learning of new developments in technical information dissemination.

A new brochure, designed and printed during the year, intends to provide quickly the essential features of DCIC's various outputs and their availability.

TABLE VI. MEETINGS ATTENDED BY DCIC PERSONNEL

Meeting Designation	Location	Date
Annual Meeting of Tripartite Technical Cooperation Program (TTCP)	San Francisco, California	May, 1969
Annual Meeting of the American Ceramic Society	Washington, D. C.	May, 1969
Contractors Meeting for AFML's ADP Program on Graphite for Reentry Vehicles	W-PAFB, Ohio	June, 1969
National Engineering Information Conference	Washington, D. C.	June, 1969
Ninth Biennial Carbon Conference	Boston, Massachusetts	June, 1969
Army Conference on "Ceramics for Structural Use"	Boston, Massachusetts	August, 1969
Basic Science Symposium of the American Ceramic Society	Ottawa, Canada	August, 1969
AFML Program Review on Refractory Materials for Supersonic Vehicles	W-PAFB, Ohio	October, 1969
Refractories Composites Working Group Meeting	Seattle, Washington	October, 1969
American Ceramic Society Meeting	Seattle, Washington	October, 1969
Conference on Communications Among Scientists and Technologists	Baltimore, Maryland	September, 1969
AFML Information Center Managers Meeting	W-PAFB, Ohio	April, 1970

Also, a special display booth describing DCIC's operation, services, and products was designed and built for use at public exhibits. The booth was set up in the lobby of Battelle during April, 1970, and then at the following meetings:

(1) Annual Meeting of the American Ceramic Society, Philadelphia, Pennsylvania, May 4-6, 1970

(2) Air Force Symposium and SAMPE Exposition, Miami Beach, Florida, May 19-21, 1970

(3) Regional Meeting of the American Chemical Society, Columbus, Ohio, June 2-5, 1970.

Copies of the DCIC brochure and the *Ceramic Awareness Bulletin* were handed out at the booth. Since the total visitors to the booth at all meetings numbered less than 200, it is concluded that the publicity obtained in this manner is not worth the effort involved.

There were 27 visitors to the Center during the year, exclusive of Battelle staff members.

ADVISORY COMMITTEE

DCIC receives valued guidance from an Advisory Committee composed of the following distinguished members of the technical community it serves:

Dr. John B. Wachtman, Jr.	National Bureau of Standards
Dr. George J. Bair	Corning Glass Works
Irving Berman	Army Materials & Mechanics Research Center
Charles F. Bersch	Naval Air Systems Command
James J. Gangler	National Aeronautics and Space Administration, Washington, D. C.
Donald Kummer	McDonnel-Douglas
Nathan E. Promisel	National Materials Advisory Board
William G. Ramke	Air Force Materials Laboratory
Frank P. Reid	American Ceramic Society
Dr. Thomas Vasilos	AVCO
Barry R. Emrich (Ex-Officio)	Air Force Materials Laboratory

The third meeting of the Advisory Committee was held on November 13, 1969. The agenda featured discussions of DCIC's products and services – to extend and more fully explore thoughts and suggestions from previous meetings concerning the adequacy of Center products and services and possible ways to improve them. The Committee's report on the meeting is given in the Appendix.

FUNDING AND EXPENDITURES

DCIC is operating under a 2-year contract which was effective on May 1, 1969, and which should provide operational funds of about $423,000.

Expenditures for the 12-month period from May, 1969, through April, 1970, amounted to $190,840. The amount budgeted for this period was $199,000. Table VII gives a breakdown of the amounts budgeted and expended for different activities, and reflects expenditures for generating specific technical outputs of $95,832 and for information-input and nontechnical-support work of $66,462. Expenditures during each of the 3 years of operation are compared in Table VIII. The present lower expenditure rate has resulted from a $50,000 reduction in appropriations on contract renewal.

TABLE VII. BREAKDOWN OF DCIC COSTS

Activity	Budget	Expenditure
Coordination and Management	$ 20,000	$ 24,766
Technical Analysis and Output	95,000	95,832
Inquiry Service	(30,000)	(21,566)
Ceramic Awareness Bulletin	(15,000)	(21,620)
Special Reports	(7,500)	(30,809)
Databook	(42,500)	(21,837)
Information Support (includes input evaluation and abstracting)	80,000	66,462
Marketing Program	4,000	3,780
	$199,000	$190,840

TABLE VIII. ANNUAL DCIC EXPENDITURES

	First Year	Second Year	Third Year
Coordination and Management	$ 45,657	$ 30,760	$ 24,766
Technical Analysis and Output	69,915	128,277	95,832
Inquiry Service	(18,268)	(19,444)	(21,566)
Ceramic Awareness Bulletin	(12,209)	(20,592)	(21,620)
Special Reports	(13,013)	(82,861)	(30,809)
Databook	(26,425)	(5,380)	(21,837)
Information Support (includes input evaluation and abstracting)	91,487	83,804	66,462
Marketing Program	3,030	5,744	3,780
	$210,089	$248,585	$190,840

MARKETING OF OUTPUT

Efforts were continued at DCIC directed to instituting user charges. A marketing plan* formulated in accordance with DoD and AFML directives has been the basis for these efforts. The plan, which was submitted to AFML in October, 1968, contemplated marketing through interface organizations and placing initial emphasis on marketing the following products:

*Presented in DCIC Report 69-6 (AFML-TR-69-210), "Report on Defense Ceramic Information Center", August, 1969.

(1) Selected special and state-of-the-art reports

(2) Addenda and revisions of the *Databook,* "Engineering Properties of Ceramics"

(3) *Ceramic Awareness Bulletin.*

During the year, two topical reports were marketed: (1) DCIC 69-1, presenting information revealed at the DCIC-arranged Ceramic Armor Symposium and (2) "Summary of Papers, 1969 Carbon Conference", issued in cooperation with the American Carbon Committee. Also, as discussed later, DCIC negotiated with the American Ceramic Society for the Society's publication and marketing of DCIC Report 68-3 in book form. DCIC 68-3 is a comprehensive treatment on the subject of mechanical-property measurements on brittle materials. In 1967, as an independent venture, the Ceramic Society obtained permission to reprint and issue DCIC's *Databook* in the form of a special Society publication for marketing to the public. The Society's sales of this book are included in the following table which summarizes all sales to date of DCIC products exclusive of sales by the Defense Documentation Center and the Federal Clearinghouse:

DCIC Product	Number Sold 1967	1968	1969	1970	Approximate Gross Income	Marketing Organization
Databook	1096	329	234	140	$27,100	American Ceramic Society
Carbon Conference Papers	–	–	93	25	944	American Carbon Committee
Ceramic Armor Symposium Papers (DCIC 69-1)	–	–	245	18	3,945	DCIC (with funds reverting to government)
TOTAL	1076	329	572	183	$31,849	

In these marketing activities, there has been no application of sales income to DCIC operations, in accord with regulations governing the disposition of funds obtained from the sale of government property.

The American Ceramic Society has been responsive to DCIC's interest in the possibility of the Society serving as an interface organization through which DCIC outputs are marketed, and has established an ad-hoc Committee on Publication of DCIC Reports. In discussions with this committee, the following areas have been identified as those where concerns exist about Society involvement with DCIC:

(1) Possible excessive cost to the Society, suggesting the desirability of government subsidization to help with initial expenses and to limit any financial loss in handling DCIC outputs (The above-mentioned negotiations with the

Society for printing and marketing DCIC Report 68-3 in book form are not yet finalized because of this factor, since no DCIC funds can be applied to defray initial expenses of the venture.)

(2) The changing conditions and regulations governing DCIC usage, particularly with respect to expectations from marketing programs

(3) The present requirement for peer approval of Society publications

(4) The Society's need to avoid preferential treatment of special interests and to undertake only those activities from which benefits can accrue to its members and the general public.

Cooperative DCIC-Society endeavors, of course, are not precluded by these concerns. It is generally recognized that the services of the Society and DCIC tend to complement one another, and the Society and DCIC have agreed that they should continue to work closely together toward effecting arrangements that can result in improved transfer of ceramic technical information. One such possibility is the joint publishing endeavor discussed above under "Information Input" for the transfer of DCIC-collected information from government projects to the open literature.

Among commercial publishing houses, Plenum Publishing Corporation has exhibited the greatest interest to date in marketing DCIC outputs. They are considering whether DCIC reports offer them a reasonable marketing venture, and have decided that DCIC's *Ceramic Awareness Bulletin* does not hold sufficient prospect for financial return for them to risk marketing it. This decision supports the conclusion from DCIC's survey of the *CAB* audience, mentioned previously in the section devoted to the *CAB*, that marketing *CAB* is not presently a sound venture.

In an effort to resolve the marketing problems, AFML has suggested the possibility of establishing a central interface organization which would market products and services of all AFML information centers. The concept is believed to offer promise for eliminating present constraints on DCIC's marketing endeavors, and to be the best approach yet proposed to marketing problems. A principal reservation is the question of whether operation of an interface organization can be made compatible with the proposed use of service charges as a means to obtain reliable guidance for determining the need for and value of a center's services.

FUTURE PLANS

DCIC will continue to provide products and services of the established types in support of the defense effort. These include:

(1) Answering technical inquiries

(2) Publication of the *Ceramic Awareness Bulletin*

(3) Updating and upgrading the *Databook,* AFML-TR-66-52

(4) Compilation of government ceramic R&D programs

(5) Preparation of technical reviews and state-of-the-art reports.

The priority given to providing a specific product or service at DCIC will depend on its urgency and importance to the defense effort. In addition, future attention will continue on:

(1) Improving efficiency of DCIC operations to reduce costs where possible

(2) Identifying specific audience needs for ceramic technical information, and adjusting DCIC activities to meet these needs

(3) Marketing of products and developing sources for supplementary income

(4) Electronic storage of portions of DCIC's technical-information bank.

APPENDIX

ADVISORY COMMITTEE REPORT

ADVISORY COMMITTEE REPORT

The third meeting of the DCIC Advisory Committee* was held at Battelle's Columbus Laboratories on November 13, 1969. The Center was represented by Winston Duckworth, the Director of DCIC, James F. Lynch, Manager of Technical Information and Manager of Information Operations, and by C. L. Downey. The Sponsor was represented by Barry R. Emrich of the Air Force Materials Laboratory.

The meeting followed an agenda which was supplied to the committee in advance of their meeting and which was very helpful to members in preparing for the meeting. The committee appreciates this procedure and recommends that it be continued at future Advisory Committee meetings.

Mr. Duckworth indicated that the role of the committee should continue to be that of advising DCIC on ways to optimize the usefulness of its services. The committee will continue to rely on DCIC for detailed minutes of each meeting thus freeing members for maximum participation in discussion and limiting each member's note taking to a listing of his input to the committee report. Two new procedures were introduced to facilitate the preparation of the report. First, the general responsibility of each committee member for comment on all aspects of DCIC's operation was augmented by assigning each member special responsibility for reviewing one of the five major outputs of DCIC. These outputs and the committee assignments are: (1) *Ceramic Awareness Bulletin* – Promisel, (2) Ceramic Research and Development Program Summary – Bair and Ramke, (3) *Databook* on Engineering Properties of Ceramics – Berman and Wachtman, (4) Special Reports – Gangler and Reid, and (5) Inquiry Service – Vasilos. Second, the meeting was concluded with a brief executive session, limited to committee members, to permit discussion of recommendations. The committee found both of these procedures useful and recommends that they be followed in future meetings.

Ceramic Awareness Bulletin

The response to DCIC's survey questionnaire indicates strong interest in *CAB* by its present readership and generally confirms the committee's opinion that *CAB* provides a valuable service and should certainly be continued. The circulation probably could be appreciably increased by aggressive promotion, but indefinitely continued increase seems neither desirable nor feasible. A gradual tendency toward leveling off to a growth rate of a few percent per year is probably to be expected as coverage of most of the active members of the DoD ceramics research and management community is achieved. Such a leveling off, if it occurs, should not, therefore, be interpreted unfavorably to *CAB*.

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*Members:

Dr. George J. Bair
Mr. I. Berman
Mr. Charles F. Bersch (not present at meeting)
Mr. James J. Gangler
Mr. Donald L. Kummer (not present at meeting)
Mr. N. E. Promisel
Mr. William Ramke
Mr. Frank P. Reid
Dr. Thomas Vasilos
Dr. John B. Wachtman, Jr., Chairman

Results of the survey questionnaire indicate that the "New R&D" Section is rated as most important followed in order by "Selected Accessions", "Technical Briefings", and "Meetings Calendar"; this rating by the general readership agrees with the committee's evaluation expressed in their last report.

Acquisition procedures are based on Commerce Business Daily, reports of contracts let (DD 1498 forms), Notices of Projects from Science Information Exchange, R&D activity summaries released by government agencies, and contacts with researchers. These procedures appear to provide good coverage of U.S. Government sponsored research although some in-house research may go unrecognized because public notice of contracts is not required. To avoid serious omissions it is important that DCIC compile a comprehensive list of individuals for periodic inquiry concerning in-house research bearing in mind the problems of communication within large laboratories and the possible need for several contacts close to the working level within a single laboratory. Coverage of current nongovernment sponsored research in the United States and of currently available unclassified foreign research is primarily based on open journal literature and therefore represents a later stage of reporting. Items in these two categories comprise only a very small part of the contents of *CAB*. The committee understands that the primary function assigned by the Sponsor to DCIC is to survey the U.S. Government supported research, but improved coverage of these other categories would provide a more complete picture of current ceramic research. Increased coverage of nongovernment supported U.S. research appears impractical because of the proprietary nature of much of this work but exchange agreements with Japanese and European ceramic research groups might be useful to increase the coverage of foreign research. Such exchange agreements are impeded by the "export control" limitation on *CAB* and other outputs, but perhaps approval for exchange of selected portions of DCIC's outputs might be obtained from the Air Force and these portions used in trade for information with the Japanese "Institute for Researches on Inorganic Materials", the Ceramic Center at Harwell, and similar foreign groups. A report on Japanese ceramic research currently being prepared by C. Klingsberg and I. Warshaw should be useful to DCIC as might be the ONR European reports.

The choice of coverage and selectivity of "New R&D", "Selected Accessions", and "Technical Briefings" were discussed. DCIC has added about 3900 accessions to its file after screening its acquisitions for relevance to ceramics of interest to defense applications placing special emphasis upon structural applications and using the condition that electronic ceramics are generally left to EPIC (Electronic Products Information Center). The committee recommends that a reference to EPIC's reports be routinely carried in *CAB*.

From 3900 accessions a total of 243 "Selected Accessions" were presented in the first 15 issues of *CAB* with selection being based on the judgment of DCIC's technical specialists that each item was of considerable technical significance to the processing, properties, or application of ceramics. In general, the selections appear to be excellent and well reported. The committee recommends continuation of this procedure and suggests that DCIC attempt to classify these selected accessions as well as items in the R&D program summary as a basis for identifying trends in the development of ceramics. Such a survey of trends might form a valuable DCIC special report which would be of considerable interest to managers concerned with ceramics if the selection process used by DCIC does not produce bias, such as omission of electronic ceramics. Perhaps the R&D program summary would be a sufficiently unbiased base for such a survey, but the

committee does not have sufficient information to make a judgment. Also, it is realized that the R&D program summaries are not complete and are not always current. The committee recommends that DCIC consider whether its information bank and technical competence equip it to prepare a special report on trends in ceramic research including both quantitative estimates of activity in various areas and qualitative evaluations of the importance and significance of each area. The committee would like to see such a report written if DCIC believes it feasible; the report could include identification of gaps in research of specific interest to DoD if any are found. When trends have been sufficiently well identified to be categorized, a survey of *CAB* readership concerning activity and evaluation of the categories would be useful.

Ceramic Research and Development Program Summary

The committee notes with pleasure the issuance of the updated version of Ceramic R&D Programs, Part I – Air Force and compliments DCIC on the improved format and improved currency of coverage. The committee's consensus is that work completed as much as a year ago should be listed but that older work should not. DCIC should strive toward this end.

The Ceramic R&D Program Summary is a valuable compilation and the committee recommends updating of all parts on a yearly schedule if possible. The federal allocation and contracting cycle is such that DoD contracts in a given fiscal year are sometimes not negotiated until January so that February and March is probably the best period to get current information. Care should be taken, as with *CAB,* to get reasonably complete coverage of in-house research. The committee recommends mutual cross references with the Ceramic Society's annual survey of ceramic research but combination of the two does not appear feasible.

Databook

The committee continues to feel that the *Databook* is a unique and very valuable source book for ceramic engineers and for a wide class of materials scientists and engineers concerned with ceramics. It is important that addenda now being prepared be completed and issued; the committee recommends that this be given the highest possible priority.

It appears preferable to issue the coming supplement as a small bound volume rather than as loose insert sheets because the latter are not easily added to the American Ceramic Society's binder.

The importance of the *Databook* and the need for updating its contents make it desirable to have a plan which allows for updating in a reasonable short period of time yet which allows for the magnitude of the task and gives each edition sufficient life to make it attractive to the purchaser. The committee suggests that DCIC consider the following plan for the *Databook* after the issuance of the current addendum. Divide the *Databook* into three parts, say (1) Oxides, (2) Carbides, (3) Other, and issue as three

separate volumes two years apart. Thus, each of the three volumes would be revised every six years and should have sufficient sales potential to justify continued publication by the American Ceramic Society.

DCIC's plan to have the textual material on properties reviewed by outside scientists is favored by the committee, but some thought as to the coverage and location of this material will be required if the above plan for division into three volumes is adopted.

Special Reports

The committee recognizes that special reports probably offer the best possibility, apart from the *Databook*, for generating income for DCIC through agreements with publishers. The committee does suggest that the special reports be carefully selected and quite limited in number because such reports are not likely to cover the cost of preparation and appear likely to indefinitely postpone work on the *Databook* if too many are undertaken. Individual committee members had high praise for several of DCIC's Special Reports including "The Evaluation and Interpretation of Mechanical Properties of Brittle Materials", "Ceramic-Armor Technology", and "Ninth Biennial Conference on Carbon – Summary of Papers".

Inquiry Service

This service appears to be the most expensive in terms of effort required per person informed. The committee recommends continuation but suggests that DCIC emphasize the procedure of sending a bibliography and/or reports to the person making inquiry rather than having DCIC's staff search out the information and summarize it. Perhaps a special bibliography might be prepared for this purpose with names and phone numbers of contract personnel currently active in various fields; this would be a useful part of the Special Report on Trends in Ceramic Research recommended above.

The committee's intent is to recommend that in dealing with inquirers DCIC move toward (1) putting the inquirers in contact with a currently active research worker rather than giving technical advice themselves, and (2) letting the inquirer do as much of the searching of documents as possible. The committee recognizes that the nature of many inquiries requires DCIC to give a detailed answer.

Other Topics

The committee hopes that a better perspective is developing concerning possible service charges by Department of Defense Information Analysis Centers. The committee continues to feel that complete support of a center such as DCIC by these charges is not possible and that the value of DCIC to the defense community justifies contract support. Service charges may be useful in generating support for a small fraction of the total cost

and for preventing frivolous requests for some outputs but charges should not be instituted in a way to deny access to government employees or to force curtailment of important outputs because they do not return their cost.

The possible transfer of certain DCIC-collected information to the archival literature was briefly mentioned and may be a good topic for discussion at a future committee meeting. Material for archival literature is usually critically reviewed by an agent of the publication concerned and revision is frequently required. Some of DCIC's activity is oriented toward current awareness and an appreciable part of its accessions consists of Progress Reports which present provisional rather than archival quality work. A process of evaluation, selection, and review would be required and the resultant publication might duplicate a subsequent journal paper by the authors of a series of progress reports.

Summary

The Defense Ceramic Information Center is ably led and is well established in its mode of operation and its relation to its audience. It has developed a well defined set of outputs of great value to the ceramics community and is now in a period of refining these and choosing the outputs to be emphasized under a limited budget. In addition to continuing the valuable ongoing activities, DCIC appears qualified to survey the present trends in ceramic research. The committee congratulates the Director and his staff on their excellent work.

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13. ABSTRACT

This report summarizes activities of the Defense Ceramic Information Center (DCIC) showing the third year of its operation at Battelle Memorial Institute's Columbus Laboratories. Information is given on the nature and distribution of the various products and services provided by the Center, and on the Center's funding and costs. A report of DCIC's Advisory Committee is included.

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